

# Overview of U.S. Crashes & Weather Environment

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# How Adverse Weather Contributes to Crashes

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- Impairs Visibility
- Decreases Stability
- Reduces Controllability



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# Dust Storm, Fog, & Snow Video



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# How Adverse Weather Contributes to Crashes

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## Impaired Visibility:

- Rain & Splash & Spray
- Fog
- Snow
- Dust Storms
- Glare



# How Adverse Weather Contributes to Crashes

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## Decreased Stability:

- Spin out - Slippery Pavements
- Rollover - Cross Winds on Trucks, Trailers, Vans
- Buffeting - Gusts with Passing Trucks





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# How Adverse Weather Contributes to Crashes

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## Reduced Controllability:

- Slippery Roads (Rain, Snow, Ice)
- Slick Spots (Bridges, Metal Plates, Oil)
- Hydroplaning (Heavy Rain)



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# Snow Crash



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# Rain Crash



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# NHTSA Crash Data

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## **Fatality Analysis Reporting System (FARS)**

- Census of Fatal Crashes (~37,000 per year)
- Police Accident Reports (~100 data elements)

## **National Automotive Sampling System (NASS)**

- Sample of Crashes (~5,000 crashes per year)
- Crashes Investigated (~ 650 data elements)



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# NHTSA Crash Data

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**FARS & NASS:**

**Gold Standard of Crash Data Systems**

**BUT:**

**We lack exposure measures for Weather in terms of Vehicle Miles Traveled (VMT) under adverse weather conditions**



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# Weather & Number of Police Reported Crashes (1998)

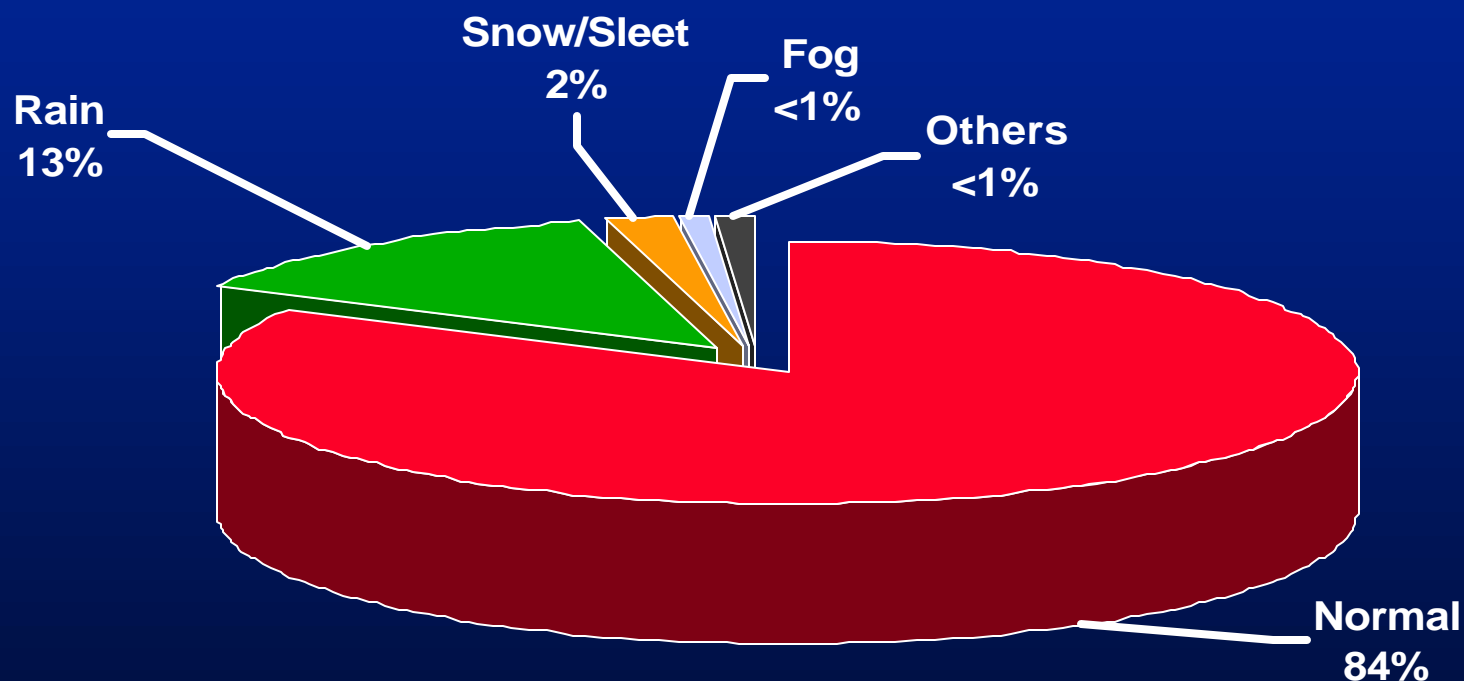
• Normal	5,329,000	(84%)
• Rain	827,000	(13%)
• Snow/Sleet	131,000	(2%)
• Fog	28,000	(<1%)
• Other*	20,000	(<1%)
• Total	6,335,000	

\* Smog, Smoke, Sand, Dust



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# Weather & Number of Police Reported Crashes (1998)



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# Weather & People Injured (1998)

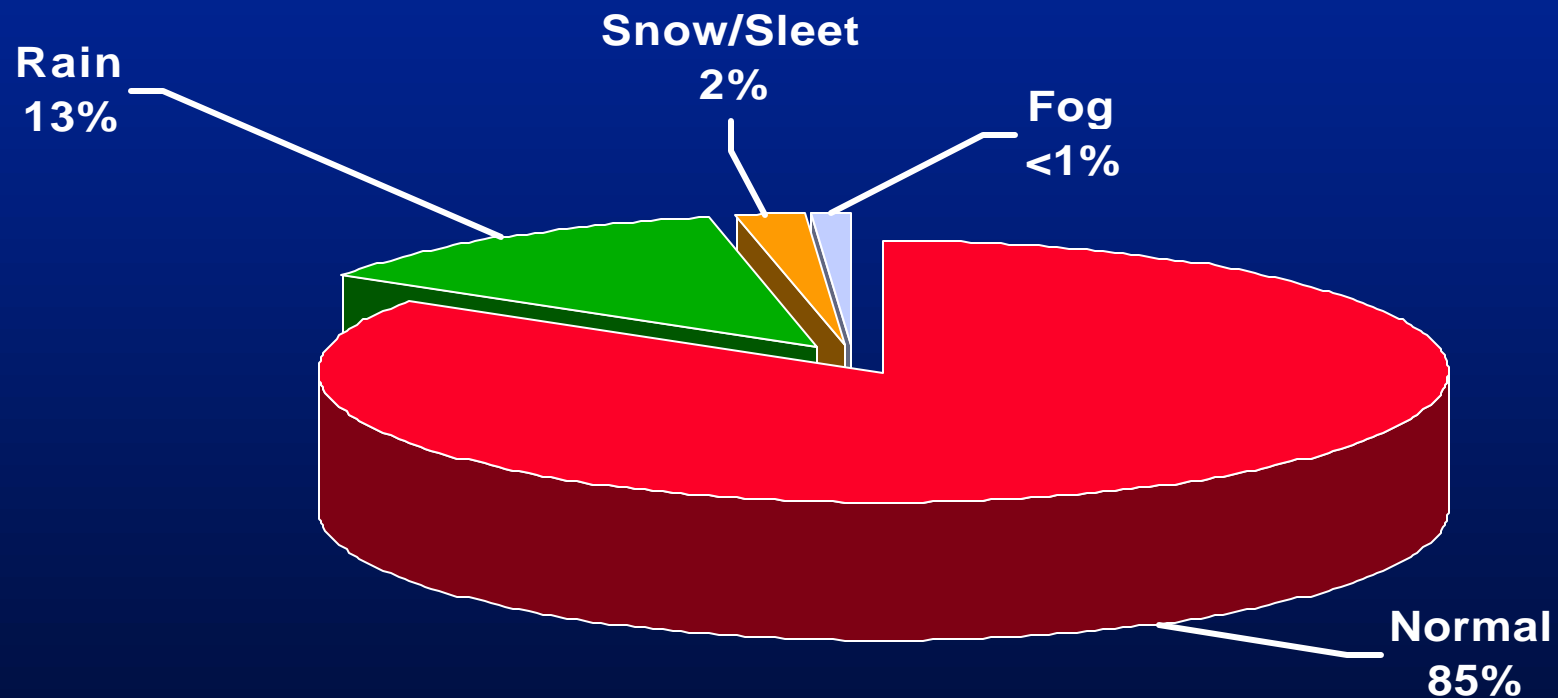
• Normal	2,709,000	(85%)
• Rain	420,000	(13%)
• Snow/Sleet	41,000	(1.3%)
• Fog	13,000	(0.4%)
• Other	9,000	(0.3%)
• Total	3,192,000	



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# Weather & Percent of People Injured in Crashes (1998)



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# Weather & People Killed (1998)

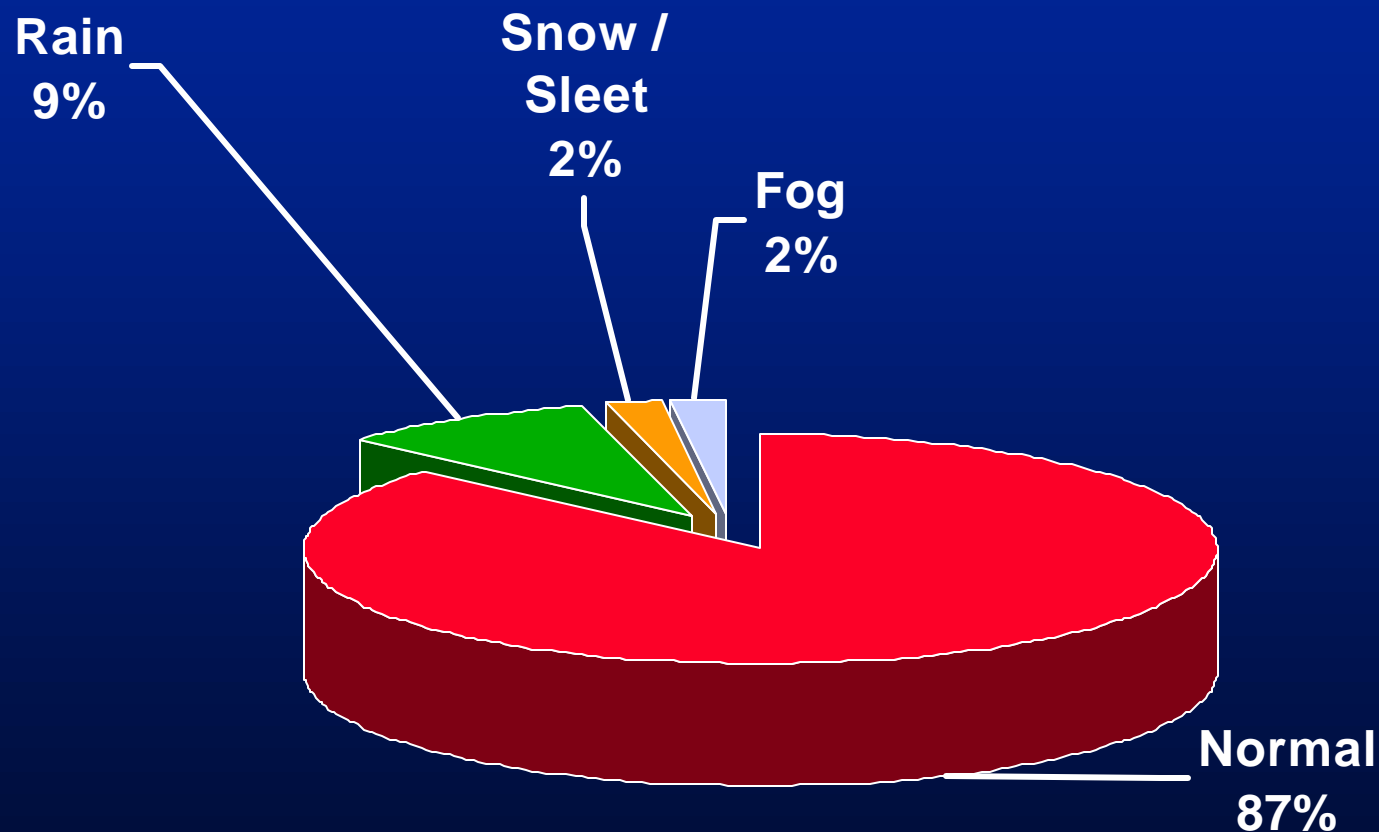
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• Normal	36,076	(87%)
• Rain	3,644	(9%)
• Snow/Sleet	691	(2%)
• Fog	719	(2%)
• Other	341	(<1%)
• Total	41,471	



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# Weather & Percent of People Killed in Crashes (1998)



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# Weather & People Killed (1989-1998)

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## People Killed

- Normal      362,473      (87%)
- Rain          37,649      (9%)
- Snow/Sleet    8,976      (2%)
- Fog            7,144      (2%)



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# Adverse Weather & Deaths by Vehicle Type (1989-98)

<u>Involved Vehicle</u>	<u>Total Deaths</u>	<u>Adverse</u>	<u>Percent</u>
• Passenger Cars	286,316	39,622	13.8
• Light Trucks	170,268	23,984	14.1
• Large Trucks*	50,877	8,664	17.0
• Motorcycles	25,987	903	3.5
• Buses*	3,239	576	17.8

*\*Commercial Vehicles Travel More in Adverse Weather*



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# Weather & 1998 Estimated Economic Costs of Crashes

• Normal	\$126 billion	(84%)
• Rain	20 billion	(13%)
• Snow/Sleet	3 billion	( 2%)
• Fog	<1 billion	(<1%)
• Other	<1 billion	( <1%)
• Total	\$150 billion/year	



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# Adverse Weather + Adverse Road Conditions

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- Adverse Weather (Rain, Snow, Fog, etc.)
- Adverse Road Conditions:
  - Roadway Surface (Wet, Snow, Ice)
- Vision Obscured (Splash, Spray, Dust, etc.)



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# Adverse Weather + Adverse Road Conditions (1989-1998)

	<u>Number</u>	<u>Percent</u>
• Crashes	12,000,000	(28%)
• Injured	8,000,000	(25%)
• Killed	80,000	(19%)



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# Adverse Weather + Adverse Road Conditions Estimated Bottom Lines

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- Crashes ~1,200,000/Year
- Injured ~ 800,000/Year
- Killed ~ 7,000/Year
- Economic Costs ~\$42 Billion/Year



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# NHTSA's Efforts to Reduce Weather Contributions to Crashes

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## Federal Standards:

- Antilock Brakes for Trucks
- Windshield Wiping, Washing & Defrosting
- Vehicle Conspicuity
- Lighting and Signaling
- Tire Information on:

Traction, Treadwear & Temperature



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# NHTSA Efforts to Reduce Weather Contributions to Crashes, Deaths & Injuries

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## Research:

- Antilock Brakes for Cars & Trucks
- Truck Splash & Spray Countermeasures
- Truck Conspicuity
- Lighting & Signaling Visibility
- Automatic Crash Notification (ACN)
- Weather & Driver Research on NADS



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# NATIONAL ADVANCED DRIVING SIMULATOR (NADS)



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# For More Information

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